number of Formative and Archaic period sites; small rock art sites; and possibly protohistoric (immediately preceding recorded history) sites. No Paleoindian sites have been recorded along the corridor, and it is not likely that they would occur.

No data exist concerning the presence of potential traditional cultural properties along the proposed Klondike Flats pipeline route. On the basis of Class I cultural resource inventory results, tribal interviews, and published and unpublished literature, the likelihood of their occurrence and estimated density on the site are low (on a scale of low-medium-high-extremely high) for traditional cultural properties associated with the Navajo Nation and medium for properties associated with the Ute Mountain Ute Tribe, White Mesa Ute Tribe, Southern Ute Tribe, and Hopi Tribe. The likelihood of their occurrence and estimated density are medium to high for properties associated with the Uintah-Ouray Ute Tribe (Fritz 2004, in progress).

3.2.18.9 Visual Resources

The proposed pipeline route between the Moab and Klondike Flats sites passes through narrow Moab Canyon, just north of the Moab site (Map 4, Appendix C), and the gently rolling desert plains north of Moab Canyon to the Klondike Flats site (Maps 2 and 3, Appendix C). Moab Canyon, characterized by steep, rugged, red sandstone cliffs, has a visual resource designation of Class II (BLM 2003b) (see Section 3.1.15 for an explanation of visual resource classes). The natural environment in the canyon has been altered somewhat by a number of cultural modifications, such as US-191, the Cane Creek Branch rail line, an overhead transmission line, and several buried pipelines. For the most part, however, the dominant features within the canyon are not the cultural modifications but the imposing sandstone cliffs. North of the canyon, the rolling desert plains are designated Class III (approximately 70 percent of the route) and Class IV (approximately 10 percent of the route) (Map 4, Appendix C).

The desert plains are characterized by undulating topography that is scattered with small desert shrubs and grasses. The background scenery along the pipeline corridor in these Class III and IV areas is composed of moderately rugged red and beige sandstone mesas and cliffs containing predominantly horizontal and diagonal features. Near the Klondike Flats site, background scenery changes to the smooth, rounded, buff-colored bluffs of the Mancos Shale.

The route proposed for the pipeline is visible to travelers on US-191 for most of its length. An approximately 4-mile stretch of the route is not entirely visible from the highway but is visible to recreationists and other travelers on the county road (historic US-160) that parallels US-191 along Moab Canyon. The proposed south access portion of the pipeline route is visible to recreationists and other travelers on Blue Hills Road (CR-138).

3.3 Crescent Junction Site

The proposed Crescent Junction disposal site (Crescent Junction site) is located about 2 miles north of the Crescent Junction interchange on I-70 and US-191. The site is about 31 miles north of the Moab site and covers several square miles of largely desert terrain that is bordered on the north by the prominent Book Cliffs. All drainage to the Green River, which ultimately flows to the Colorado River, is located several miles west of the site. Because no perennial streams or rivers are on the Crescent Junction site, aquatic ecology and surface water contamination and use are not discussed.

The Crescent Junction area is within the service territory of Utah Power, a subsidiary of PacifiCorp. The corporation maintains an existing three-phase distribution line that parallels CR-175, a frontage road between Crescent Junction and Cisco.

3.3.1 Geology

The Crescent Junction site is along the south edge of the Uinta Basin, and rocks dip gently to the north toward the basin axis. The site also overlies the northwestern part of the ancestral Paradox Basin (Figure 3–1). Nearby to the north is an erosional escarpment that rises about 600 ft; this escarpment is known as the Book Cliffs.

3.3.1.1 Stratigraphy

Mancos Shale bedrock is exposed in several places at the site. The site is underlain by 3,000 ft of Mancos Shale; the remaining 1,000 ft was removed by erosion. The Ferron Sandstone Member is about 60 ft thick and occurs in the lower 300 to 350 ft of Mancos Shale. Below the Ferron is the lowermost member of the Mancos, the Tununk Shale (see Figure 3–25).

The Dakota Sandstone underlies the Mancos Shale and is less than 100 ft thick in the Crescent Junction site area. It is likely the shallowest bedrock unit containing ground water. The Cedar Mountain Formation underlies the Dakota Sandstone.

Mancos Shale bedrock exposures are covered over much of the Crescent Junction site area by alluvial mud (Doelling 2001). This unconsolidated gray material, less than 20 ft thick, fills swales in the softest parts of the Mancos Shale and consists of silt, clay, sand, and minor fragments of sandstone. Along the west side of the site area, Quaternary stream alluvium, up to 20 ft thick deriving from Crescent Wash, covers the Mancos Shale (Doelling 2001). This material consists of sand, silt, clay, pebbles, and sparse cobbles adjacent to the Crescent Wash stream course, which heads in the Book Cliffs just to the north.

3.3.1.2 Structure

The site is in the Paradox fold and fault belt of the ancestral Paradox Basin (see Figure 3–1). The geologic structure of the Paradox Basin is discussed in Section 3.1.1. The Book Cliffs, less than 1 mile north of the site, is an erosional escarpment on the south flank of the Uinta Basin. Mancos Shale at the site dips gently (less than 10 degrees) northward (from north-northeast to north-northwest) toward the axis of the subtle, northwest-striking Whipsaw Flat syncline. Northwest-striking normal faults defining a graben of the northwest extension of the Salt Valley salt-cored anticline are about 1 to 2 miles southwest of the Crescent Junction site. These faults are not exposed on the surface and reportedly have as much as 1,000 ft of displacement, as determined by oil test wells drilled in the area in the 1920s and 1930s (Fisher 1936).

A fault mapped in 1924 during oil exploration (Harrison 1927; Fischer 1936) is believed to extend into the southwest quarter of Section 27 in the Crescent Junction site area. More recent studies do not show this fault as having surface expression (Woodward-Clyde Consultants 1984; Doelling 2001). It is unclear what geologic features were used as evidence of the fault. Surface fieldwork and an additional search for well data in the area would be necessary to confirm the existence of the fault. No other lineaments or geologic structures were noted in the Crescent Junction site area from northern Paradox Basin mapping by Friedman and Simpson (1980).

3.3.1.3 Geologic Resources

No oil and gas resources have been found in the Crescent Junction site area. The nearest known petroleum accumulation is in the Morrison Formation about 3 miles south-southwest of the Crescent Junction site. Exploratory drilling for gas is currently under way 1 to 2 miles west of the Crescent Junction site; results of this exploration are unknown. Historical drilling in the vicinity of the site indicates that the potential for oil and gas accumulations at the site is low.

Although potash resources are associated with the Paradox Formation about 3 miles south of the Crescent Junction site, the site is northeast of the Salt Valley salt-cored anticline, and thick saline deposits are not present.

Uranium and vanadium deposits, which are associated with the Morrison and Chinle Formations, have been found in scattered locations in the region. However, because of the depth of these formations (3,000 to 4,000 ft) in the Crescent Junction site area, exploration for such deposits is not economical. Copper and silver mineralization is known to occur in a few locations in the region in fault-related deposits in the Morrison Formation (Woodward-Clyde Consultants 1984). Exploration for these deposits would be uneconomical because of their great depth. Coal resources occur in the Book Cliffs just north of the site; however, they are in stratigraphically younger rocks (Mesaverde Group of Late Cretaceous age) than are present at the Crescent Junction site.

Black shales, such as the Mancos, are naturally enriched to above background concentrations in metals such as uranium, copper, silver, vanadium, mercury, arsenic, and gold. These metals likely originated in volcanic ash material that was deposited (and became bentonite) during deposition of the Mancos Shale. In a study by Marlatt (1991), sampling of Mancos Shale generally in the area between Salt Valley and the Book Cliffs found that gold content ranged from 30 to 100 micrograms per kilogram (parts per billion). These values are about 10 times the background levels but are much too low for economic extraction.

No sand and gravel deposits are present in the Crescent Junction site area. Potential deposits of such material are present just south of the Crescent Junction site area and also about 0.5 mile west of Crescent Wash (McDonald 1999). This material occurs as pediment-mantle deposits that cover Mancos Shale bedrock surfaces.

3.3.1.4 Geologic Hazards

Montmorillonite clay is found in the Mancos Shale underlying the Crescent Junction site area. Changes in water content cause the clay to shrink and swell, which can lead to subsidence (Mulvey 1992). An example of current problems associated with this clay may be seen along I-70, just south of the Crescent Junction site. Portions of the highway that cross Mancos Shale require constant maintenance because of heaving of the concrete slab structures.

The low angle of slopes and homogeneity of the Mancos Shale bedrock preclude hazardous landslides, slumping, or rock falls. The site is sufficiently distant from the Book Cliffs that hazards from rock falls are not an issue.

Earthquake risk and seismic activity in the site area are low. The nearest faults with Quaternary movement that also have surface expression are about 2 to 4 miles southwest of the site and are

related to the northwest extension of the Salt Valley salt-cored anticline (Hecker 1993). These faults are associated with salt structures in the northern part of the Paradox Basin and salt-dissolution collapse that has occurred (Wong et al. 1996). The faults are considered to be unrelated to earthquake-generating tectonic forces and not seismogenic. Seismicity in this part of the northern Paradox Basin has a low rate of occurrence, with small- to moderate-magnitude earthquakes (Wong and Humphrey 1989). The site area is in Uniform Building Code 1, indicating lowest potential for earthquake damage (Olig 1991).

The site area has a moderate-to-high radon-hazard potential for occurrence of naturally occurring indoor radon based on the geologic factors of uranium concentration, soil permeability, and ground water depth (Black 1993). The moderate-to-high rating stems from the relatively high concentration of naturally occurring uranium in Mancos Shale, the relatively high soil permeability caused by shrinking and swelling of the Mancos-derived soil, and the relatively deep depth to ground water (shallow water retards radon migration).

3.3.2 Soils

The soils at the Crescent Junction site are on the alluvial valley flats immediately south of the Book Cliffs. The area is dominated by the Toddler-Ravola-Glenton complex of soils. Because the Book Cliffs are composed mainly of shale and topped by sandstone, the Ravola family soils, which are strongly influenced by shale sediment, are probably the predominant family in the area. Table 3–30 provides characteristics of these soils.

The Ravola family is derived from shale from the Book Cliffs and is therefore moderately to strongly saline. These soils are typically very deep and well-drained. The hazard of water erosion is moderate; however, the soils are subject to gully formation and piping where runoff is concentrated.

Also occurring within the soil complex is the Toddler family of soils, which formed from a mixture of marine shale and sandstone and is also very deep and well-drained. They are moderately to strongly saline. Runoff is slow, and the erosion hazard is moderate.

Formation of the Glenton soils is strongly influenced by sandstone sediment. These soils are very deep, are well-drained, and exhibit fairly rapid permeability. Runoff is moderate to slow and erosion hazard is relatively low; however, deep gullies have formed in areas where runoff is concentrated.

Mack loam soils, associated with 2- to 6-percent slopes, are formed similarly to Toddler-Ravola-Glenton soils from alluvium derived from sandstone and shale from the Book Cliffs. They are also similar in that they are very deep and well-drained. However, these soils are composed of more loam-textured soils and therefore support a different plant community. They also have a slight, rather than moderate, water erosion hazard.

Soil materials consist of more than 60 inches of the Toddler-Rovola-Glenton family soil. This series consists of low plasticity sandy clay and silts with good infiltration characteristics. These soils are grouped into the Hydrological Group B characterized by moderately high infiltration rate with a low erosion potential (SCS 1989).

Hydrocollapse potential for these soils is low, and no subsidence areas are known to exist in the area. Conditions for liquefaction (that is, loose soils, soils with a high moisture content, and a source of vibration) do not occur, so liquefaction potential is considered low.

3.3.3 Air Quality

3.3.3.1 Ambient Air Quality

Air quality information specific to the Crescent Junction site is unavailable; however, it is expected to be similar to, or better than, that described for the Moab site because of its more remote location and lack of area development. Limited air quality data are available for the Green River, Utah, area approximately 20 miles west of the Crescent Junction site. Air quality data collected from this site are considered to be representative of the Crescent Junction site because of geologic and physiographic similarities.

Criteria pollutants (Table 3–4 and Table 3–5 in Section 3.1.4) routinely measured at the Green River station include total suspended particulates, sulfur dioxide, and nitrogen dioxide; pollutants not monitored are carbon monoxide, ozone, and lead. Measurements of pollutants at the Green River station from 1980 through 1985 were below applicable standards except for total suspended particulates, which exceeded state secondary standards (DOE 1985). There are no major sources of pollutants at the Crescent Junction site; therefore, pollutant concentrations are likely similar to those recorded at the Green River station.

The Green River area is classified as an attainment area under the NAAQS. No site-specific information is available for the Crescent Junction site. However, based on its proximity to Green River, the Crescent Junction site is also considered to be an attainment area according to these same standards.

3.3.3.2 Visibility

Visibility information specific to the Crescent Junction site is unavailable; however, it is expected to be similar to that described for the Moab site. Because the Crescent Junction site is on a plateau, the range of visibility is expected to be greater in most locations than at the Moab site where visibility is impeded by natural geologic features. However, low areas and hills are present and could impede visibility.

3.3.4 Climate and Meteorology

Climate statistics for the Crescent Junction site were obtained from Thompson Springs, Utah (5 miles east). This arid area is characterized by maximum average temperatures that range from 88 ºF in summer (the maximum recorded summer temperature is 105 ºF) to 46 ºF in winter. Minimum average temperatures range from 60 ºF in summer to 22 ºF in winter (the minimum recorded winter temperature is –23 ºF). The overall mean annual temperature is 52.8 ºF, the annual average maximum temperature is 66 ºF, and the annual average minimum is 39.7 ºF (Ashcroft et al. 1992).

Mean annual precipitation is 9.2 inches, and the frequency of precipitation events greater than 0.125 inch is less than 10 percent. Most of the precipitation occurs as rainfall during the southwest monsoon season, July through September. Maximum daily precipitation of 2.00 inches

and maximum monthly precipitation of 3.99 inches have occurred in August. The potential annual evaporation is approximately 55 inches, which greatly exceeds annual precipitation (Robson and Banta 1995).

Wind speed and direction data are currently unavailable for this site. For the purposes of this EIS, the data compiled from the Canyonlands Field Airport for the Klondike Flats site have been used (see Section 3.2.3).

3.3.5 Ground Water

3.3.5.1 Hydrostratigraphy

Unconsolidated alluvial material that is less than 20 ft thick along Crescent Wash consists of silt, clay, and minor fragments of sandstone. This material occurs just west of the site and overlies the Mancos Shale bedrock.

Bedrock at the Crescent Junction site is the upper part of the Mancos Shale; approximately 3,000 ft of the formation underlies the site. The Mancos Shale in the area consists of thin siltstone, fine-grained sandstone, and bentonitic interbeds widely spaced in the thick calcareous mudstone (Chitwood 1994). The Ferron Sandstone Member is about 60 ft thick and occurs in the lower 300 to 350 ft of the Mancos Shale (Blanchard 1990).

The Dakota Sandstone of the Late Cretaceous age underlies the Mancos Shale and consists of less than 100 ft of sandstone, conglomeratic sandstone, and shale. The Dakota Sandstone is deeper than 3,000 ft beneath the surface. The Cedar Mountain Formation of Early Cretaceous age underlies the Dakota Sandstone and consists of several sandstone and conglomeratic sandstone beds along with thick mudstone layers.

3.3.5.2 Ground Water Occurrence

No usable ground water is available in the thin alluvial deposits of Crescent Wash just west of the Crescent Junction site area.

The Ferron Sandstone Member of the Mancos Shale is not a water-bearing unit. The Mancos Shale overall does not yield ground water and forms an aquitard that inhibits ground water migration to deeper stratigraphic units (Blanchard 1990).

The Dakota Sandstone likely represents the shallowest bedrock unit containing ground water beneath the Crescent Junction site. Ground water is also present in the sandstone and conglomeratic sandstone beds of the Cedar Mountain Formation. Water in the Dakota Sandstone and Cedar Mountain Formation may be under slight artesian head from recharge to the north along the north edge of the Uinta Basin. Additional studies may be necessary to identify quantity yields from these formations.

3.3.5.3 Ground Water Quality

Inferred ground water quality for the Dakota Sandstone in this area is based on information from a well approximately 5 miles northeast of the proposed site, which had a TDS content of 1,800 mg/L (Blanchard 1990). This represents drinking water quality based on the Utah Ground Water Quality Protection program (Class II aquifer) (UAC 2003a).

3.3.5.4 Ground Water Use

The current known source of water used by residents in the Crescent Junction area is from Thompson Spring, near the town of Thompson Springs. Additional studies may be necessary to confirm uses.

3.3.6 Surface Water

3.3.6.1 Surface Water Resources

No perennial water bodies are present within the Crescent Junction site area. Surface water resources within this area are limited to storm water runoff flows within the various ephemeral washes that transect the area. The courses of the ephemeral water bodies in this area are well-established and are unlikely to migrate in a different direction or pattern. Two washes just west of the site are Crooked Wash and Crescent Wash. Several smaller washes are present in the east part of the site that are tributaries of Thompson Wash. All of these washes flow south to southwest and are tributaries of the Green River. The ephemeral washes located on the Crescent Junction site are ungaged. Extreme floodwater surface elevations or the effects of extreme storm events are not currently known.

3.3.6.2 Surface Water Quality

Soils associated with the Mancos Shale are alkaline and may have high concentrations of selenium. As a result, surface water in these ephemeral washes likely has high salinity, high turbidity, considerable hardness, and elevated levels of sulfate and selenium.

3.3.6.3 Relevant Water Quality Standards

All ephemeral water bodies within the Crescent Junction site area are tributaries of the Green River; therefore, they are subject to the water quality classifications specified in Utah Administrative Code R317-2, "Standards of Quality for Waters of the State" (UAC 2003b) (see Chapter 7.0).

3.3.7 Floodplains

Crescent Wash, an ephemeral stream, runs east of the Crescent Junction site and drains an area of 18 square miles. No floodplains exist at the Crescent Junction site, but it is prone to extreme surface flooding during precipitation events. The disposal cell would be located outside flood-prone areas of Crescent Wash.

3.3.8 Wetlands

No known wetlands exist in or near the Crescent Junction site, but because riparian vegetation is present in places, the area would be investigated for any small, isolated wetlands prior to construction. Appendix F includes a further description of floodplains and wetlands at the Crescent Junction site.

3.3.9 Terrestrial Ecology

This section describes the vegetation and wildlife aspects, including protected and sensitive species, for the Crescent Junction site. Although natural habitat is limited, it does exist for wildlife adapted to a desert environment, including some species of birds, mammals, and reptiles. The site topography is relatively flat, although steep rock mesas dominate the area to the north of the site, which also influences available habitat.

3.3.9.1 Terrestrial Vegetation and Wildlife

In most areas of the site, vegetation is indicative of a disturbed site and varies from the potential native vegetation. About 50 percent of the Crescent Junction site area is covered by low-growing vegetation. The northern part of the site is covered with a gray veneer of debris from a recent outwash originating in the nearby Mancos Shale hills. The outwash area is mostly bare with some prickly pear cactus, cheatgrass, and Russian thistle. Vegetation in the south-central and southeast areas of the site also consists primarily of species such as Russian thistle, cheatgrass, and prickly pear with a few native shrubs and perennial grasses, including Gardner saltbush, galleta, and Indian ricegrass. The range condition of this area would probably rate as poor to fair.

Shrubs include black greasewood, shadscale, and Gardner saltbush; an understory consists primarily of annual weeds such as cheatgrass and Russian thistle with a few perennial grasses (galleta and Indian ricegrass). Table 3–31 lists characteristics of the potential natural vegetation.

Black greasewood, an obligate phreatophyte, dominates the plant community in this area and accounts for the relatively high productivity. Occasional saltcedar (tamarisk) occurs in the drainages. Toddler family soils provide the structure to support Gardner and mat saltbush vegetation.

Wildlife population diversity and densities are limited in the Crescent Junction site area by the vegetation and habitat types present. However, large mammals such as the coyote and pronghorn antelope, adapted to a desert environment, likely occur in the vicinity of the Crescent Junction site. Smaller wildlife species adapted to a desert environment, including mammal, bird, and reptile, are also present. Coyote, mule deer, and bobcat may use the deep gullies as protection while traveling. Crescent Wash is near the site and may provide enough water near the surface to support low-density cottonwood trees that can serve as nesting and roosting sites for raptors, horned lark, sparrows, and other birds. The deep gullies are used as nesting sites for swallows. Coyote, white-tailed prairie dog, desert cottontail, and black-tailed jackrabbit may also use this habitat for food and cover. Raptors such as red-tailed hawks, golden eagles, and harriers use the area as a hunting ground. The presence of human activities close to I-70 may serve as a limiting factor in the density of wildlife species in this area. No critical habitat has been identified for wildlife at this site.

3.3.9.2 Species Listed Under the Endangered Species Act

This section describes federally listed terrestrial threatened and endangered, proposed, or candidate species that are or may be present in the Crescent Junction disposal site area. In March 2003, DOE requested an updated list of such species from USF&WS that may be present or affected by DOE's proposed alternatives. USF&WS responded in April 2003 with a list for Grand County. Table 3–32 lists a subset of those species that may occur in the vicinity of the Crescent Junction site.

Spatial data for the species listed in Table 3–32 were obtained from the Utah Conservation Data Center (UCDC). This dataset was compiled by the Utah Natural Heritage Program (UNHP) of UDWR, in which species occurrences are depicted as points at a scale of 1:24,000 on 7.5-minute topographic quad maps. Spatial data depicting the Crescent Junction site were overlaid on the species of concern spatial data to evaluate known species occurrences in the area.

The status of each of these species in the vicinity of the Crescent Junction site is briefly discussed below. Appendix A1, "Biological Assessment," provides more detailed information concerning these federally listed species that may be in the vicinity of the Crescent Junction site or could be affected by activities at the site.

There is a cluster of known populations of Jones' cycladenia on BLM land in Grand County approximately 11 to 17 miles northeast of Moab (UDWR 2003b). However, there are no known occurrences of the species on the Crescent Junction site.

UDWR (2003b) reported an unconfirmed sighting in the vicinity of the Crescent Junction site in 1989. All black-footed ferrets currently in the wild are believed to be the result of a federal reintroduction program. It is highly unlikely that the black-footed ferrets reintroduced in Uinta and Duchesne Counties in 1999 or their offspring could occur on or in the vicinity of the Crescent Junction site.

Numerous white-tailed prairie dog (currently under review for federal listing) colonies ranging in size from 10 acres to 2,445 acres occur around the Crescent Junction area (Seglund 2004). It is unknown to what extent individual colonies or a combination of colonies could support black-footed ferrets.

The Utah Gap Analysis (UDWR 1999) indicates that potential high-quality bald eagle wintering habitat exists throughout many of the project areas. However, it is not known to nest or night roost nor is it known to have been observed in the vicinity of the Crescent Junction site.

Mexican spotted owls were historically reported to occupy the Book Cliffs to the north of the Crescent Junction site but have not been observed in the vicinity recently (USF&WS 2001).

There is no designated or proposed critical habitat for any of the above federally protected species in the vicinity of the Crescent Junction site.

DOE, in consultation with USF&WS and BLM, would determine the need for additional habitat evaluations and surveys for species that may be affected by the proposed action should this alternative be selected.

3.3.9.3 Other Special Status Species

Special status species are those that are protected under federal and state regulations other than the ESA; these regulations include the MBTA, Executive Order 13186, and Birds of Conservation Concern (USF&WS 2002f). UDWR provided a list of species that DOE should consider in this EIS (UDWR 2003b). Table 3–33 lists sensitive plant species that may occur in the site region. Table 3–34 describes state-listed animal species. Table 3–35 lists bird species protected under the MBTA and species listed as Birds of Conservation Concern.

Birds of primary concern are the peregrine falcon, red-tailed hawk, turkey vulture, burrowing owl, Swainson's hawk, and ferruginous hawk. Burrowing owl habitat may exist in the vicinity of white-tailed prairie dog colonies. Although burrowing owls have not been documented as occurring in the vicinity of this site, prairie dog burrows may provide suitable habitat for nesting.

3.3.10 Land Use

The Crescent Junction site is located in Grand County on lands administered by BLM approximately 31 miles north of the Moab site. The area under consideration encompasses 2,400 acres of undeveloped land near the base of the Book Cliffs on a low-lying plateau named Crescent Flats. It is north and northeast of the I-70 junction with US-191 at Crescent Junction. Area land uses are shown on Figure 3–18.

Although not designated by BLM as a recreational area, the site has no access controls, and the area's hiking, biking, and camping uses are low. BLM has designated the Crescent Junction area as access-limited to existing roads. Favorable weather allows recreational access in virtually all seasons. Although no recreational use numbers are available for this area, hiking, biking, and camping use has been observed to be low. The southern boundary of the Floy Canyon Wilderness Study Area is approximately 2 miles north and northwest of the site.

Existing land uses include grazing, oil and gas leasing, and mining claims. The site is part of the Crescent Canyon grazing allotment, which is currently under a grazing permit until 2010. There are no mining claims on the proposed disposal cell location. Currently, all sections of interest for the potential Crescent Junction site are held by oil and gas leases. None of the leases are held by production. The existing oil and gas leases expire between 2008 and 2011. BLM has temporarily suspended further mineral, oil, and gas leasing at this site, pending completion of this EIS.

The proposed location of the Williams Crescent Junction Petroleum Products terminal and pumping station is adjacent to the southern boundary of the site. The terminal would consist of a 50-acre fenced site that includes storage tanks, a truck-loading rack, a vapor combustion system, an electrical substation, offices, and warehouse buildings. This facility would be served largely by truck traffic. Williams estimates the average daily throughput from the trucks to be approximately 10,000 barrels per day.

The nearest commercial property is a gas station and convenience store at the Crescent Junction interchange (approximately 1.5 miles south) located between I-70 and the Union Pacific Railroad tracks. This property has at least one full-time resident and may have as many as five residents during the busy summer season. Much of the property on the east and west side of US-191 is owned by the State of Utah SITLA. These state lands are currently up for sale and are subject to future commercial development.

The northern boundary of Arches National Park is approximately 9 miles southeast of the Crescent Junction site.

3.3.11 Cultural Resources

The cultural history of the Crescent Junction site is discussed in the more general cultural history of southeastern Utah described in Section 3.1.13.1; the Class I cultural resource inventory that was conducted for this site is described in Section 3.1.13.2.

Results of the Class I inventory indicate that one linear Class III cultural resource survey, associated with a transmission line, has been conducted within the Crescent Junction site. On the basis of this survey, one prehistoric cultural site eligible for inclusion in the National Register of Historic Places has been identified within the boundaries of the site. The potential for cultural resources to occur on unsurveyed portions of the site is low. One predictive model based on soil type and landform (Berry 2003) indicates that an estimated 1.9 cultural sites per square mile could be expected to occur on the site.

No data exist concerning the presence of potential traditional cultural properties on the Crescent Junction site. On the basis of Class I cultural resource inventory results, tribal interviews, and published and unpublished literature, the likelihood of their occurrence and estimated density on the site are low (on a scale of low-medium-high-extremely high) for traditional cultural properties associated with the Ute Mountain Ute Tribe, White Mesa Ute Tribe, Southern Ute Tribe, Navajo Nation, and Hopi Tribe. The likelihood of their occurrence and estimated density on the site are medium for traditional cultural properties associated with the Uintah-Ouray Ute Tribe (Fritz 2004, in progress).

3.3.12 Noise and Vibration

The Crescent Junction site is located in a quiet desert environment where natural phenomena such as wind, rain, and wildlife account for most natural background noise. At times, insect activity and birds may account for significant portions of environmental noise. Sources of man-made background noise may include traffic on I-70, Union Pacific Railroad, aircraft flying overhead, and off-road recreation. Average L_{dn} would likely range from 22 dB on calm days to 38 dB on windy days (Brattstrom and Bondello 1983).

Neither background noise nor ground vibration data are available for the Crescent Junction site. Traffic noise from I-70 could raise the 1-hour L_{eq} to 55 dBA at the southern edge of the site. However, the background noise level from natural and man-made noise would average less than 50 dBA across the site.

3.3.13 Visual Resources

The Crescent Junction site is located between I-70 and the towering Book Cliffs, a linear geologic feature that runs east-west on the north side of I-70 from Grand Junction, Colorado, to Price, Utah. The proposed disposal cell location is on flat to gently undulating, buff-colored ground that is sparsely vegetated with bunchgrasses and small shrubs. The steep, dissected cliffs of the Book Cliffs provide a dramatic backdrop to the north. Westbound and eastbound travelers on I-70, travelers stopping at a scenic overlook on eastbound I-70 (Figure 3–33), and patrons of the Crescent Junction gas station have a clear view of the proposed disposal cell location. The site is also visible from several residences, currently unoccupied, in the Crescent Junction area and from several residences on the west end of Thompson Springs, a small town 6 miles east of Crescent Junction. Visual resources are classified as Class III in this area (BLM 2003b) (see Section 3.1.15 for an explanation of visual resource classes).

3.3.14 Infrastructure

The infrastructure supporting the Crescent Junction site is essentially identical to that described in Section 3.2.13 for Klondike Flats, except that the Utah Power three-phase distribution line that would supply the site runs along CR-175.

Figure 3–33. View of the Crescent Junction Site from the I-70 Scenic Overlook

3.3.15 Transportation

Section 3.1.17 provides details of area federal, state, and county road and railroad use. Table 3–15 in Section 3.1.17 provides AADT, level of congestion, truck percent, and accident rates for US-191 from Moab to Crescent Junction and for I-70 in this area. Figure 3–21 shows the location of area roads and railroad lines. US-191 terminates at Crescent Junction and the I-70 interchange. Accident rates on US-191 are low, and it is not considered congested at this junction; however, accident rates on I-70 in the area are considered moderate. Both US-191 and I-70 are considered not congested in this area.

Several local county roads provide informal access to I-70 and area attractions or towns. These are also described in Section 3.1.17. CR-175 is a paved frontage road that connects Crescent Junction to Thompson Springs and other areas to the east. Two county roads, CR-233 and CR-234, begin just east of Crescent Junction and trend north into backcountry areas. They are dirt tracks and are not passable after heavy rains.

3.3.16 Socioeconomics

Crescent Junction is approximately 31 miles north of the Moab site in Grand County, Utah (discussed in Section 3.1.18). It consists of a combination gas station and convenience store with several unoccupied former residences. The nearest town is Thompson Springs, which is 6 miles east of Crescent Junction, where temporary housing is limited to a few trailers and a campground.

3.3.17 Human Health

3.3.17.1 Background Radon and Natural Radiation

The greatest hazard from natural radiation sources is inhaled radioactivity, mostly from radon-222 and its radioactive decay products in homes and buildings, which accounts for about 200 mrem/yr. Additional natural sources include radioactive material in the earth (primarily external radiation from the uranium and thorium decay series), radioactive material in the body (primarily potassium-40), and cosmic rays from space filtered by the atmosphere.

Section 3.2.16.1 discusses natural sources of radiation. The actual radiation dose from natural background radiation varies with location. On the basis of data from the Blanding, Utah, area, the radiation dose from cosmic and cosmogenic radioactivity would be about 68 mrem/yr at the Crescent Junction site. The radiation dose from external terrestrial radioactivity would be about 74 mrem/yr, and the radiation dose from radon-222 and its radioactive decay products would be about 260 mrem/yr (IUC 2003). The total natural background radiation dose at the Crescent Junction site would be about 440 mrem/yr, considerably higher than the national average of 300 mrem/yr (Table 3–36).

No one currently resides at the Crescent Junction site. Currently, one full-time resident lives near the gas station and convenience store (approximately 1.5 miles to the south), which is located immediately south of I-70 and east of US-191. As many as five residents have lived in the area during past summer seasons. According to 2000 census data, the population within 50 miles of the Crescent Junction site was about 10,200 (Figure 3–34). Assuming that all these people were exposed to 440 mrem/yr, the population dose would be about 4,500 person-rem per year.

Table 3–36. U.S. and the Crescent Junction Site Natural Background Radiation Doses

Source	U.S. Average Natural Background Radiation Dose (millirem per year)	Crescent Junction Natural Background Radiation Dose (millirem per year)
Cosmic and cosmogenic radioactivity	28	68
Terrestrial radioactivity	28	74
Internal radioactivity	40	40
Inhaled radioactivity	200	260
Rounded Total	**300**	**440**

3.3.18 Environmental Justice

Section 3.1.20 describes the legal basis for evaluating environmental justice and general census characteristics in Grand County. One census block within 50 miles of the Crescent Junction site is reported to have greater than 50 percent minority population; this census block is approximately 20 miles north of the Crescent Junction site (Figure 3–35). One census block group north of the Crescent Junction site shows a reported income of less than $18,244 (poverty level for a family of four). It is located about 25 miles north of the Crescent Junction site (Figure 3–36). As discussed in Section 3.1.20, approximately 94 percent of Grand County was identified in the 2000 census as white, non-Hispanic.

3.3.19 Pipeline Corridor

This section describes the proposed pipeline corridor between the Klondike Flats site and the Crescent Junction site. It does not repeat information from the Moab site to the Klondike Flats site (Section 3.2.18), unless the information is necessary to provide context for this discussion.

3.3.19.1 Geology

Between the Klondike Flats site and Crescent Junction site, the proposed pipeline corridor passes over the lower and middle parts of the Mancos Shale for about 10 miles. The Mancos Shale contains expansive clay (montmorillonite) that shrinks and swells with changes in water content. No active faults or subsidence potential exists in the corridor.

3.3.19.2 Soils

Soils within the proposed pipeline corridor are formed primarily on marine shale uplands and pediments and on alluvial fans and drainages consisting of sediments derived from nearby shale and sandstone uplands. Three general soil map units occur along this segment of the pipeline corridor from south to north: rock outcrop-Nakai-Moenkopi, Chipeta-Killpack-Blueflat, and Toddler-Ravola-Glenton (SCS 1989).

The potential natural vegetation on Nakai-Moenkopi soils include (1) the shrubs fourwing saltbush, shadscale, blackbrush, and winterfat and (2) the common grasses Indian ricegrass and galleta. Plant abundance and diversity on Chipeta-Killpack-Blueflat soils are very low, even for arid rangeland, because the low-permeability soils promote rapid runoff, have low available water capacity, and are often highly saline (SCS 1989). Potential vegetation consists primarily of low shrubs, including mat saltbush and Gardner saltbush with occasional shadscale and bud sagebrush. The potential natural vegetation of the Ravola-Toddler-Glenton soils is described in Section 3.2.8. Detailed descriptions of soil types and potential natural vegetation for this pipeline corridor are available in the SOWP (DOE 2003).

3.3.19.3 Ground Water

North of the Klondike Flats site, the pipeline corridor passes generally over the lowermost part of the Mancos Shale, and ground water in the underlying Dakota Sandstone and Cedar Mountain Formations is at depths of 100 to 300 ft. For the last 3 to 4 miles to the proposed disposal site, the pipeline corridor passes over an increasing thickness of Mancos Shale, and the depth to ground water in the Dakota/Cedar Mountain increases gradually to about 3,000 ft at the Crescent Junction site.

3.3.19.4 Surface Water

The proposed slurry pipeline corridor extending north from the Klondike Flats site to the Crescent Junction site would cross several washes (e.g., Klondike Wash and Thompson Wash) and a number of other smaller, unnamed drainage features, all of which are ephemeral. No perennial surface waters are present within this proposed pipeline corridor.

Storm water runoff in the local ephemeral streams is characterized by a rapid rise in flow rates, followed by rapid recession, primarily because of the small storage capacity of the surface soils in the area. The flows in these drainage features occur primarily in response to local heavy rainfall and, occasionally, snowmelt runoff.

Water Quality and Existing Surface Water Contamination

Because there are no perennial surface waters, no data are available regarding contamination of existing surface water resources. When storm water flows through the washes within this pipeline corridor, the water is laden with sediment, and water quality is anticipated to be poor. These ephemeral washes collect surface water runoff primarily from areas composed predominantly of the Mancos Shale. Soils associated with the Mancos Shale are alkaline and may have high concentrations of selenium. As a result, surface water quality from these drainage features would likely be characterized as having high salinity, turbidity, and hardness and having elevated levels of sulfate and selenium.

Relevant Water Quality Standards

All ephemeral water bodies in this pipeline corridor are eventually tributaries to either the Green River or the Colorado River; therefore, they are subject to the water quality classifications specified in Utah Administrative Code R317-2-13 (see Chapter 7.0).

3.3.19.5 Floodplains and Wetlands

No floodplains or wetlands are known to exist along the proposed pipeline route. However, because the route may cross intermittent washes with riparian vegetation, such washes would be investigated for any small, isolated wetlands prior to construction.

3.3.19.6 Terrestrial Ecology

Section 3.3.9 describes the affected environment for terrestrial ecology on a regional basis in the Crescent Junction site area (Maps 1 and 2, Appendix C). This section addresses only the areas, wildlife, and habitat that would be affected by the proposed pipeline corridor between the Klondike Flats and Crescent Junction sites. General information applicable to the species and site descriptions as described in Section 3.3.9 are not repeated in this section.

Approximately 10 miles of the route is aligned in relatively undisturbed areas. As was the case with the segment from Moab to the Klondike Flats site, habitat for mammals is limited by sparse vegetation along the segment from the Klondike Flats site to the Crescent Junction site. Large mammals adapted to a desert environment, such as the pronghorn antelope, are likely to be present intermittently in the proposed pipeline corridor.

Table 3–25 in Section 3.2.8 presents a list of federally listed threatened and endangered species that may occur in the vicinity of the Crescent Junction site. Appendix A1, "Biological Assessment," provides more detailed information concerning these species. Of these species, the black-footed ferret and bald eagle, as described in Section 3.2.8.2 are the primary federally listed species of concern in the vicinity of the pipeline corridor between the Crescent Junction and Klondike Flats sites. In addition, the white-tailed prairie dog, currently in review for federal listing, is also of concern.

UDWR (2003b) reported an unconfirmed sighting in the vicinity of the Crescent Junction site in 1989. All black-footed ferrets currently in the wild are believed to be the result of a federal reintroduction program. It is highly unlikely that the black-footed ferrets reintroduced in Uinta and Duchesne Counties in 1999 or their offspring could occur along the pipeline corridor between the Crescent Junction and Klondike Flats sites. The environmental assessment

conducted for the Grand County landfill (BLM 1995), which is located within 3 miles of the Klondike Flats site, concluded that there is no present or historical evidence of black-footed ferrets. Nevertheless, the black-footed ferret is of primary concern where potentially suitable habitat (i.e., prairie dog colonies) may exist along the northernmost sections of the route.

Numerous white-tailed prairie dog (currently under review for federal listing) colonies ranging in size from 10 acres to 2,445 acres occur around the Crescent Junction area (Seglund 2004). It is unknown to what extent individual colonies or a combination of these colonies could support black-footed ferrets.

The Utah Gap Analysis (UDWR 1999) indicates that potential high-quality bald eagle wintering habitat exists throughout many of the project areas. However, it is not known to nest or night roost nor is it known to have been observed in the vicinity of the proposed pipeline corridor between the Moab site and the Crescent Junction site.

There is no designated or proposed critical habitat for any of the above federally protected species in the vicinity of the proposed pipeline corridor between the Klondike Flats site and the Crescent Junction site.

DOE, in consultation with USF&WS and BLM, would determine the need for additional habitat evaluations and surveys for threatened and endangered species that may be affected by the proposed action should this transportation mode be selected.

The burrowing owl (Cresto 2003), ferruginous hawk, peregrine falcon, and Swainson's hawk are not federally listed species, but they are included on the state list of sensitive species and are also protected under the MBTA. Because of previous sightings to the south of this site, it can be assumed that the peregrine falcon and ferruginous hawk may be present in the vicinity of the pipeline corridor.

3.3.19.7 Land Use

The proposed pipeline route from the Klondike Flats site to the Crescent Junction site is approximately 13 miles. Approximately 33 percent of the route would be located on federal lands administered by BLM, approximately 15 percent would be on private lands, and the remaining 52 percent would be on lands under the jurisdiction of the State of Utah.

3.3.19.8 Cultural Resources

The cultural history of this segment of the pipeline corridor is discussed in the more general cultural history of southeastern Utah described in Section 3.1.13.1; the Class I cultural resource inventory that was conducted for the proposed corridors is described in Section 3.1.13.2.

Results of the Class I inventory indicate that the segment of the pipeline corridor between the Klondike Flats site and Crescent Junction site contains approximately 20 known cultural sites that are either eligible for inclusion in the National Register of Historic Places or have been recommended as eligible. However, approximately 5 miles of the proposed route near the town of Crescent Junction have not been surveyed. The 20 sites include historic sites associated with transportation, mining, ranching, and agriculture; prehistoric lithic scatters of unknown affiliation; a small number of Formative and Archaic period sites; small rock art sites; and possibly protohistoric sites. No Paleoindian sites have been recorded along the corridor, and it is not likely that they would occur.

No data exist concerning the presence of potential traditional cultural properties along the pipeline corridor between the Klondike Flats site and Crescent Junction site. On the basis of Class I cultural resource inventory results, tribal interviews, and published and unpublished literature, the likelihood of their occurrence and estimated density on the site are low (on a scale of low-medium-high-extremely high) for traditional cultural properties associated with the Southern Ute Tribe, Navajo Nation, and Hopi Tribe. The likelihood of their occurrence and estimated density are medium for traditional cultural properties associated with the Ute Mountain Ute Tribe and White Mesa Ute Tribe and medium to high for properties associated with the Uintah-Ouray Ute Tribe (Fritz 2004, in progress).

3.3.19.9 Visual Resources

Visual resources along the Klondike Flats portion of the Crescent Junction pipeline route are described in Section 3.2.18.9. Visual resources along the remainder of the route, between the Klondike Flats and Crescent Junction sites, consist primarily of flat to gently rolling, light beige and light gray desert plains that are sparsely vegetated by saltbush and bunchgrass. The background scenery along this portion of the route varies. Along the east side of the corridor lie the rugged red and beige rocks of Arches National Park; along the west side of the corridor near the Klondike Flats site lie the smooth, rounded, buff-colored bluffs of Mancos Shale.

Approximately 3 miles north of the Klondike Flats site, the bluffs on the west side of the corridor come to an end and are replaced by the wide, flat expanse of the gray Mancos Shale desert. Visual resource designations along the entire route from the Moab site to the Crescent Junction site include Class III areas (approximately 80 percent of the route), Class IV areas (approximately 10 percent of the route), and the Class II area within Moab Canyon (approximately 10 percent of the route). Section 3.1.15 presents descriptions of the various visual resource classes.

The portion of the pipeline route from Klondike Flats to Crescent Junction is visible to travelers on US-191 for approximately 3 miles north of the Klondike Flats site. At that point, the route veers off to the northeast along an existing pipeline route and is not visible to the general public until it crosses I-70 near the town of Crescent Junction.

3.4 White Mesa Mill Site

The proposed White Mesa Mill disposal site (White Mesa Mill site) is located in San Juan County, Utah, approximately 5 miles south of Blanding, Utah. Facilities consist of a uranium-ore processing mill, ore storage pad, and four lined tailings cells with leak-detection systems and ground water monitor wells. The facilities are situated within a 5,415-acre area of private property owned primarily by IUC. The mill itself occupies approximately 50 acres, and the tailings disposal ponds occupy approximately 450 acres. The site is accessible from a half-mile-long private road connected to US-191.

Since early 1997, the mill has processed more than 100,000 tons from several additional feed stocks. Since its inception, the mill has processed a total of 4,083,144 tons of materials. This total is for all processing periods combined. Annual production of yellowcake has been as high as 3.75 million pounds per year in the 1985–1990 period. In comparison, the Moab contaminated materials are estimated at 11.8 million tons and have an in situ dry density between 90 (slimes) and 97 pounds per cubic foot. A more detailed summary of White Mesa Mill operations is provided in Appendix G.